ADVANCED MANAGEMENT

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The Society for the Advancement of Management

Economic Transition

Employe Morale

Simo-Graph

Standardizing Time Studies

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CONTENTS

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Comment

HOW to train workers and supervisors for defense production quickly and effectively is one of the crucial problems of current operation. We do not lack the technical wisdom to do good training; but the danger is that in the interests of speed we will take short cuts which ignore vital elements in the process. Several tested axioms need to be constantly borne in mind here by those responsible for such training; and continuous oversight of actual shop instruction by a responsible high executive is essential to assuring that these axioms are being continuously adhered to.

There is, first, no substitute for time. Training, we must recall, means that workers have come to think, feel and act appropriately,—which in this case means in relation to the job itself, to the shop surroundings human and material, to the management of the organization as a whole and ultimately to the cause of defense. To accomplish this specification in the total organism of a worker obviously requires time; it requires telling, showing, practice, habit formation. It requires muscular and mental adjustments which are new; it requires feelings about the total setup which are new. All these are only acquired through conscious learning,—spaced, repeated, simplified and again repeated. There is no substitute for each and every new worker going through every step in the process. "The one who is doing the learning must do the learning."

There is, moreover, no good training without good standards of performance. Such standards have to be explicitly established, clearly understood by supervisors, clearly provided for in shop organization and control of material and machine utilization, and last but not least, made the basic content of the training job itself. The standard practice thus requiring to be imparted is not a simple idea nor is it arrived at apart from close coordination of literally every staff and line executive who contributes to defining, initiating and controlling the flow of work. Furthermore, in work involving completely new specifications as most war work does, good training will not take place and it will not bear fruit unless each department foreman and inspector has profited by the same knowledge which is being given the job worker plus the instruction in matters of over-all, interprocess and interdepartment relations which is part of the rightful content of supervisory training.

Third, experience is conclusive that training will only be as good as top management requires it to be and insists that it be. So integral to total operation is the training job, truly understood, that unless every superintendent, division head, foreman and straw boss has a vivid sense that management is enthusiastically supporting training efforts, the job gets slighted or short-circuited.

Fourth, good training today—both because we understand its psychology and because the war production makes extraordinary demands upon everyone—has to pay special attention to worker attitudes. This means, for example, that in addition to answering all the workers' "how" questions, the trainer is also answering his questions as to "what" and especially as to "why." Why these standards of accuracy in production? Why these standards of volume of output? Why this drive for prompt delivery? Training is compounded of muscular "sets" and total attitudes of interest, pride, zeal and loyalty. And the mental and emotional elements in the way the job is approached and carried through become the more important half of the process of instruction for managers to acknowledge and train for under the conditions of today.

The final axiom follows from all this,—namely, that good training is never finished. Managers who take the training approach in their dealings with those whose work they are directing, already understand that every executive contact is at bottom a training occasion. All of us in striving to realize important aims have to be "toned up" occasionally,—that is, reminded and renewed as to goals, standards and details. This toning up is itself a substantial part of the continuing training emphasis just referred to.

Training of individuals to participate in a modern industrial organization is more and more being understood to be a necessarily elaborate, planned, time-consuming and dignified educational effort. The emergency requirements only accentuate the truth. We should be sure that in a mistaken effort to cut corners we do not short-cut the necessary educational steps without which we will not step-up output sufficiently nor tone up morale toward essential national unity.

* * * *

This issue of ADVANCED MANAGEMENT contains brief words of appreciation and acknowledgment of the achievements in the world of management of two

(Please turn to page 115)

Economic Transition and Its Human Consequences[1]

By M. KING HUBBERT

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THE relationship between management and labor is a monetary as well as a functional one, and much of the current discussion of the problems of labor is premised upon this pecuniary aspect. One hears many variations upon one or the other of the two familiar themes: "What management expects of labor" and "What labor expects of management." Although the two sets of expectations thus stated are frequently contradictory and mutually exclusive, still there is implied in most of these discussions the assumption that, if approached in a spirit of co-operation and fair play, the differences between management and labor are capable of being reconciled.

On the basis of this assumption a great deal of effort has been expended over the last several years by both management and labor to iron out such differences as have arisen, and indeed individual differences have been resolved from time to time. The fact still remains, however, that the last decade has witnessed more unemployment and hardship for labor than any other period in American history, and despite these efforts the lot of labor as a whole is becoming gradually more difficult.

This paper reviews the problem from a somewhat new point of view, taking particular care to observe certain inviolable physical relationships which heretofore have sometimes been ignored in discussions of social phenomena. It will be seen that these problems are the necessary consequences of a long-term evolutionary progression, and they could easily have been anticipated from data then available as early as the end of the nineteenth century.

Elements of the Problem

Labor is but one component of an evolving social complex, and the entire complex consists of a large number of components each of which varies continuously as a function of time and, in general, as a function of the magnitude of each of the other components. For present purposes the principal variables considered will be: (1) the rate of production of industry, (2) the state of technological advancement at different times as indicated by certain measurable quantities, and (3) the number of man-hours of human participation per year required at successive times.

After the physical limitations of these variables and their mutual interdependencies have been investigated we shall then consider briefly the superimposed monetary aspects of the problem.

Growth of Industrial Production

Since industrial activity is infinitely complex, the problem of resolving it into simple factors would be too formidable to contemplate were it not for certain basic physical facts which greatly simplify our task. The materials upon which all industry operates are obtained directly or indirectly from the earth. Because of their limited occurrence and widespread essential industrial uses, the most diagnostic of these are the industrial metals: iron, copper, tin, lead, zinc, aluminum, etc., of which the most widely used is iron.

In the course of industrial activity these material resources are taken from the ground from geologically rare deposits of high concentration and through usage gradually are scattered back to the earth at concentrations too low to permit recovery. These metals, particularly iron and steel, constitute the backbone of industry; consequently a record of the rate of iron production in the United States becomes a good indicator of our industrial activity and growth.

An even better physical common denominator of all industrial activity is the rate of degradation of energy by industry. In this case every wheel that turns accounts for its share of the total energy degraded or, conversely, the total degradation of energy by industrial activity during a given period is automatically an integrated record of that activity. While nearly all of the energy available to industry is obtained directly or indirectly from solar radiation, the dominant share is derived from the fossil fuels, coal and oil, with water power playing an important but secondary role.

[1] Based upon a private memorandum on the subject "Labor's Changing Role" prepared for Mr. Morris L. Cooke of the Office of Production Management, Washington, D. C.

Utilizing these facts, let us now examine briefly a few of the outstanding social changes that have been occurring in the United States during the past century. From the first census in 1790 until that of 1860 our population expanded exponentially at such a rate as to double its number every twenty-three years, or at a steady increase of 3 per cent per annum. From the early part of the nineteenth century until the decade between 1910 and 1920 our industrial activity increased in such a manner as to double its annual output every ten to twelve years, or at an annual rate of increase of 6 to 7 per cent per annum.

Taking the foregoing facts, and without any other considerations than the properties of matter and energy, and with some knowledge of the quantities of resources available (or at least of the size of the earth) let us ask what the future of such growth curves must be. Simple arithmetic shows that no physical quantity on the face of the earth can continue to increase in such a manner as to double itself at equal intervals of time indefinitely because the quantities involved would soon exceed the resources of the entire earth or else involve magnitudes greater than the earth has room to accommodate.

The rate at which such quantities increase is best illustrated by the ancient problem of placing grains of wheat on the squares of a checkerboard, putting one grain on the first square and doubling the amount for each successive square. The number of grains required in this manner for the last, or sixty-fourth, square would be roundly 10^{19} which is approximately 10,000 times the largest annual wheat crop ever raised in the United States. Had the checkerboard been one of ten squares to the side instead of eight, the amount of wheat required for the last square would have had a mass 3,000 times that of the entire earth.

Similarly, if the population of the United States had continued after the Civil War to double every twenty-three years, there would have been one person per every four square feet—just room to stand—by the year 2314 A.D.

Similar considerations show that with regard to iron and coal the rate of growth so as to double annual production every ten to twelve years, which prevailed until about 1910, could not have been sustained for any great length of time before shortage of resources would have become acute.

We must conclude, therefore, that any such exponential expansion, whether of populations or of industrial production based upon the exploitation of non-replaceable mineral resources, is a distinctly temporary state of affairs, and that this phase must be followed by a long-time period of leveling off or decline. This is represented graphically in Figure 1. Here four different types of growth are illustrated. All four are identical up until about 1915, doubling every eleven years until that time. Curve *A* shows the same type of growth continuing. This is the course our investment structure would have to follow in order to maintain a constant interest rate. Curve *B* shows a quantity that levels off to a maximum. Water power would behave in this manner if developed to the limit. Curve *C* shows a

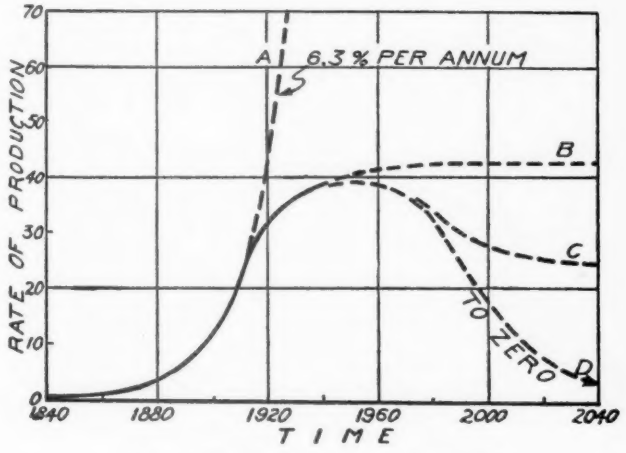

FIG. 1. Generalized types of growth.[2]

leveling off at some level which, in general, is intermediate between a maximum and a minimum. Lumber production would behave in this manner over a long-time period. This behavior is also descriptive of the long-time growth of biologic populations in general. Never can a population increase indefinitely, and only rarely does one decrease to zero and become extinct. Curve *D* is descriptive of the rate of production of all non-recurrent mineral resources. The curve rises to one or more maxima and ultimately declines to zero as the resource is exhausted. Every individual oil pool has a life history similar to Curve *D* from the time of discovery, with a productive period before exhaustion averaging only fifteen or twenty years.

The area under any production curve is the integral or the cumulative production. For the production curve of any exhaustible resource, regardless of the detailed shape of the curve, this total area can never exceed the initial supply of that resource.

The curves of Figure 1 are but generalized types and

[2] Hubbert, M. King, Determining the most probable, *Technocracy*, Series A, No. 12, 1938, pages 4-10.

the time scale was chosen arbitrarily. Now let us investigate an actual case. For this we choose our whole composite industrial activity as represented by the rate of energy consumption derived from the principal sources of industrial energy—coal, oil, gas and water power. This is plotted in Figure 2. The rate of consumption of energy increased exponentially until about 1910 at a rate of growth of about 6.3 per cent per annum, or doubling every eleven years. As we have anticipated already, this initial period of rapid expansion was followed by a period of leveling off which became perceptible shortly after 1910 and was well on its way before 1930.

Had this leveling off not occurred the production in

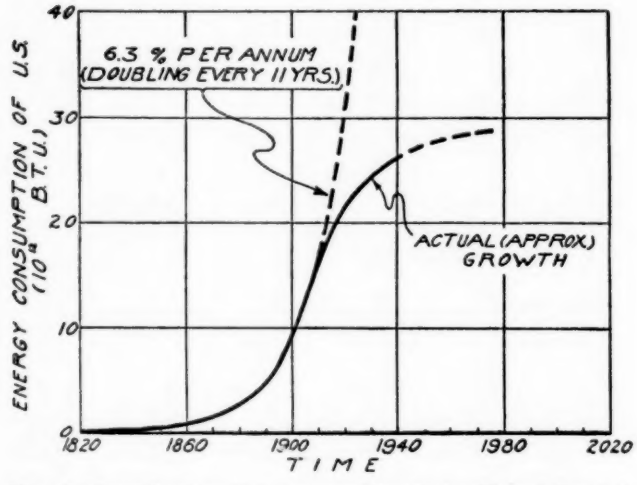

FIG. 2. Growth of energy consumption in the United States.[3]

1929 would have been 1½ times what it actually was, and that of today (1941) something more than twice what it now is. In fact, the decade of the 1920's, which is still commonly supposed to have been one of industrial boom, actually holds the record with the all-time low of the preceding century for rate of industrial growth.

While such a leveling off of industrial production must eventually occur for reasons of physical limitation of resources, and in our industry the process is well under way already, let us emphasize that the initiation of this period at the time it actually did occur cannot be ascribed to scarcity of resources. In fact it is still possible, physically, to step production up to a considerably higher level than it has yet attained but the time required to do so would be brief and again the curve would level off.

[3] Data from *Statistical Abstract of the United States.*

Advance of Technology

The foregoing discussion provides us with an essential basis for the consideration of one of our particular problems, labor. What effect may long-term changes of the kind we have been discussing be expected to have upon human employment? To this we are unable to give an answer until we have reviewed one more essential element of the progression under consideration: the advance of technology.

Technology, like industry, is too complicated to review in detail, so here too let us seek to discover some unifying principle that fairly sums up at least the direction of its advances. That there is such a direction will be at once recognized when we consider that we hear repeatedly of the development of methods and processes that are *improvements* over those previously used—airplanes that fly faster, engines that perform the same work for less fuel, machines whose rate of output is greater than their predecessors, etc.,—but seldom of new machines or processes that are *inferior* to those used before. It is the intuitive recognition of this fact that lends humor to the complicated contraptions of the latter kind in the Rube Goldberg comic strips—one rarely meets such things in real life.

This unidirectional progression of technological change toward better processes and equipment has far-reaching consequences upon various of the components of an evolving social complex. By and large, our prime movers become increasingly efficient with time; or inversely, the amount of fuel required to produce one unit of mechanical work decreases continuously with time. For example, the amount of coal required to produce 1 kilowatt-hour has decreased from a best practice of more than 6 pounds in 1900 to an average for all central power stations of about 1.4 pounds at present, with current best practice at something less than 1 pound.

In general also the trend is toward higher speeds. If an existing machine is replaced by one of newer design which performs the same function it is probable that the new machine will operate faster than the old one. If it does it will require less metal and less factory space *per unit rate of output* than its predecessor.

Finally, almost certainly it will be more automatic and will require fewer man-hours of human attention per unit of product than before. Suppose, for example, that it merely runs twice as fast with the same number of operators. This would still amount to an increase of the output per man by a factor of two, or a reduction by one-half of the man-hours per unit produced. Consequently, so far as human employment is concerned,

we may sum up the effect of technological progression by saying that the *direction* of that progression is *always* such that the number of man-hours per unit of product will decrease with time.

Effect on Employment

Now, in order to see what this means over a long-time period consider the curves of Figure 3. Here the curve *A* is the annual output of products by any industry or the composite physical production of all

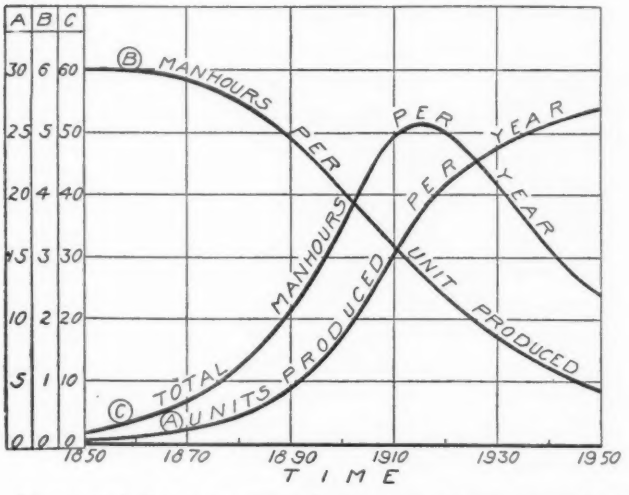

FIG. 3. Relation between production, man-hours per unit of product and the total man-hours per year required by industry.[4]

industries. The curve *B* is the number of man-hours required to produce one unit. The curve C is the product of the ordinates of the curves *A* and *B*, and represents the total number of man-hours per year required for that production:

$$(\text{Man-hours/unit}) \times (\text{units/year}) = (\text{man-hours/year}).$$

On a long-time basis any individual industry or the composite of all industries will have a production curve as a function of time similar to the curve *A* in Figure 3. For reasons just stated the curve of man-hours required per unit will have a negative slope with the limit zero and will have a shape similar to that of curve *B*. The product curve of total man-hours per year will accordingly possess all the essential features of curve *C*. It will rise to one or more maxima and thereafter, for an indefinite period of time, decline.

These three curves, as far as labor is concerned, are the fundamental curves of any industry. They answer definitely and completely the debated question of whether or not machines and new industries create jobs. The answer is that during the period of expansion the number of man-hours required increases for a while. That is to say that for a temporary period the birth-rate of new jobs exceeds the death-rate of old ones. After that, due jointly to the leveling off of production and the continuation of technological improvement, the death-rate of old jobs exceeds the birth-rate of new ones—this notwithstanding the fact that production may still be increasing.

Taking the curves of Figure 3 as representing the sum total of American industry, which they are drawn approximately to do, they show that there should have been an all-time peak in the number of man-hours of employment in the general period of the World War, and that the man-hours per year should have decreased every succeeding year since (assuming production to have followed the smooth curve as drawn). This, as a matter of fact, describes pretty well what has happened. The all-time maximum of man-hours of the manufacturing industry occurred about 1920; that of railroads in 1920; that of agriculture prior to 1910; that of boots and shoes in 1923; that of the petroleum industry in 1929; that of the iron and steel industry during or before 1919,—to name only a few instances in each of which production has subsequently increased.

By 1929 the unemployed were estimated at approximately 3,000,000. With the shutdown of industry in the early 1930's this pyramided to upwards of 17 millions. It was a simple matter to show at that time that if production were brought back to 1929 levels with 1929 hours of labor (a 48-hour week) the unemployed would still number 10 to 12 millions due to the continued decline of curve *B* and hence of curve *C*, and to the concomitant increase of the population.

From the foregoing considerations several important conclusions of long-term validity appear inescapable: (1) From now on into the indefinite future the dominant characteristic of the growth of American industry will be one of slight or slow expansion. Any rapid expansion will require but brief periods of time. (2) Technological progression will continue in the same general direction as heretofore—toward higher speeds and efficiencies and greater automaticity. (3) The result of this will be that our total industrial activity will be maintained with a steadily decreasing requirement of man-hours of labor per year, and a corresponding decrease of the hours of work per person. Any re-

[4] Hubbert, M. King, "Man-hours—A Declining Quantity," *Technocracy*, Series A, No. 8, 1936, pages 11-20.

versal of this trend can only result from a sharp increase in the curve of production (curve *A*, Fig. 3) which, as we have already seen, can continue only temporarily. This is true independently of whether production be stabilized at the lowest possible level of social tolerance, or at an upper level limited by the saturation of the public's physical capacity to consume.

The Pecuniary Aspects of the Problem

Thus, while we have disposed of the problem of labor to the extent that we may state with confidence that the trend of labor is toward less work, we still are left with something of an empty feeling when we consider that heretofore it has been our repeated experience that less labor has spelled less food and clothing and in general less social well-being. What we do not yet appear to have perceived, however, is that a correlation between a small amount of work and a livelihood of scarcity is by no means a physical necessity.

In fact, the existence of such a correlation is due entirely to our monetary system of accounting and distribution—the pecuniary relationship earlier alluded to. The fundamental difficulty of such a system arises from the fact that all money is based upon the exchange values of the property rights of physical assets, and that all such values tend to zero as the thing evaluated becomes abundant.

On a long-term basis production can only be maintained at a rate equal to that of consumption, and the rate of consumption is in turn determined by the rate of monetary expenditure by the consumer. The incomes of the vast majority of all consumers, however, are now derived almost exclusively from the marketing of man-hours of human labor or service. Furthermore, the market value of human labor is subject to the same rules as that of other commodities. As man-hours become abundant their prices go down.

The principal function of a labor union is that of a marketing organization for man-hours. Here, as in the case of all other marketing organizations, the unit values or prices can only be maintained by a regulated scarcity of the product. Man-hours are rendered scarce and hourly wage rates maintained by the familiar devices of collective bargaining, the closed shop, etc.

Intrinsically, however, this is a losing game. In the case of ordinary commodities scarcity can be maintained by curtailment of production or by destruction of the product. In the case of labor, however, neither of these devices is applicable. The rate of production of man-hours is proportional to the population itself and is still increasing, whereas the annual requirement for man-hours has already passed its peak and is decreasing. This leaves a steadily increasing net surplus of unmarketable man-hours for which the wages are zero.

A second reason why this game is a losing one is to be found in the fact that man-hours are competing not only among themselves but with kilowatt-hours also. Physically, a man-hour of labor represents only a certain small quantity of work; a kilowatt-hour represents at least thirteen times as much. Yet kilowatt-hours can be bought at a commercial rate of from 1 to 3 cents each, whereas man-hours at 25 cents each constitute starvation wages.

This brings us to the first of our difficulties: If consumption and production are to be maintained at a level sufficient for the optimum fulfillment of the needs of our population it is absolutely necessary that purchasing power be distributed to the consuming public at a corresponding rate. This is true independently of the number of hours of work per person, of the total man-hours worked, or of whether anyone works at all or not. If this purchasing power should continue to be distributed on the basis of the hours of work, it would be necessary to increase the wage rates in proportion to the decrease in man-hours—a procedure in direct contradiction to the principles of sound finance.

Another and more serious difficulty, however, presents itself when we consider that on a long-term basis the accounts of any business enterprise must show consistently a net excess of gains over losses. For a productive enterprise, the gross income is derived from the sale of products or services to the consuming public. A part of the gross income goes into corporation surplus and amortization funds and, for the larger enterprises, a part of it goes to augment the incomes of a small number of individuals beyond their capacity to consume. The result is that a significant fraction of the money taken from the consuming public is not again made available as consumer purchasing power. Hence, in the ordinary process of the profitable operation of a productive enterprise, the money demanded from the purchasing fund of the consumer is consistently in excess of the amount paid back to this fund. Since this is true of each productive enterprise, it is also true of the totality of our industry, leaving us with a net deficit of consumer purchasing power *regardless of the rate of production, the price of the product, the number of hours of labor employed or of the wages paid.*

This deficit is a necessary result of our ordinary system of production and distribution and, if not made up

by independent measures, will lead promptly to the exhaustion of consumer purchasing power and industrial shutdown. The methods of making up this deficit have been different at different times. In the period preceding 1920 it was continuously made up by industrial expansion. The money withheld as savings plus additional money created by expansion of debt was employed for the construction of new industrial plants and in this manner was paid out as workmen's salaries and so became available as additional purchasing power.

It is clear, however, that such a program could only be maintained temporarily because the exponential expansion of productive capacity which this necessitates would soon outdistance the consumer purchasing power whose rate of increase would simultaneously be retarded by the technological advance and resultant curtailment of man-hours. This, in fact, is what did happen and the leveling off of the production curve before 1920 was the result.

With industrial expansion no longer adequate, the deficit in purchasing power has had to be made up by other devices. During the 1920's this was accomplished by means of large-scale credits abroad and the installment-selling campaign at home. While these were only temporary expedients not capable of employment as a permanent policy they did at least succeed in postponing the shutdown until the fall of 1929.

Since 1933 the deficit has been continuously made up by means of the federal unbalanced budget and the pyramiding of the federal debt. This device, like the measures preceding, is still only a temporary expedient, yet it is the only thing at present which is keeping the country off the rocks.

In view of these several facts it appears, therefore, that the recurrent differences between management and labor are but the superficial symptoms of a far deeper malady than perhaps has been generally recognized. Furthermore, the problems involved are not only of vital interest to those immediately concerned, but to all the rest of our population as well, because the rate of production and distribution by our industry, and hence the standard of living of our entire population, is involved.

Physically and technologically there are no impediments whatever to a rate of production and distribution on a scale of unprecedented abundance—and this with continually diminishing hours of labor and with zero unemployment. The fact that this is not being achieved is clearly due to the existence of barriers of another kind entirely, the nature of some of which have been indicated. In fact, so far as this major problem is concerned, it is a matter of indifference whether the relations between management and labor be amicable or otherwise, for in either case it is no longer possible for management unaided by subsidies from the unbalanced budget of the federal government to pay to labor as a whole enough purchasing power to forestall industrial shutdown. At the same time a condition of unnecessary and enforced scarcity is becoming increasingly irksome to an enlightened public.

Our present method of controlling industry and distributing its products is obviously outmoded, as there is every reason that it should be, and the biggest social and engineering job before us is the design and installation of a new one. When that has been achieved we may all look forward to abundance, security and leisure. Until it has been done, our contemporary problems of insecurity, unemployment and privation may be expected to remain with us and to become increasingly acute.

Employe Morale: Warnings and Hints

By J. L. WOLFF

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Training Within Industry Consultant, Office of Production Management

EMPLOYE morale is vital to the welfare of every firm regardless of its size or the type of its business. Executives who ignore or take it for granted are inefficient—even though they may possess many other qualifications. It is hard to realize how often, without meaning to, supervisors at all levels impair morale by thoughtless and inept acts. Management may dismiss such things as of little account, but the subordinate resents and remembers them.

I have before me a booklet of possibly 2500 words in fourteen pages. It is small enough to be slipped easily into the pocket. It tells in detail what the employes of one large department store may or may not do. I find it the "must-iest" book I have ever seen. "Must" appears twenty-seven times; "permitted, permissible, permission"—ten times; "Allowed"—six times; "required"—four times; "prohibited"—three times; "may not"—two times; "granted" (by management)—twice.

It opens by giving the store hours and goes on to add: "employes . . . *must* adhere"; "employes *must* remain . . ."; "he or she is *required* to . . ."; "employes *must* punch time clock."

Next we find "employes are *required* to enter and leave . . ."; "employes are *not permitted* to leave . . ."; "employes are *required* to wear . . ."; "coats *must* be be locked in . . ."; "parcel check *must* first be OK'd . . ."; "merchandise . . . *must* be OK'd . . ."; the repetition—"coats *must* be kept in lockers . . ."; "valuables *must not* be left in lockers . . ."; "lockers *must* be kept locked"; "knocking on elevator door is *not permitted*"; "An employe who is not wearing her hat is expected to step back to allow customers to enter the car first, to allow them to leave first, and to give her place in a crowded car, *saying with a smile,* 'Please take my place.'"

Under the heading of "shopping" they have "must" five times in fourteen short lines. Even under the subject of "Suggestion Box," they stuck in a "must." Here they are asking employes for help. Note the tone they use: "The management always welcomes suggestions for the betterment of its service. Suggestions *must* be written, signed with name and number, and placed in the suggestion box. One dollar is paid for each accepted suggestion."

They finally print sixteen paragraphs containing specific reasons for dismissal. As you read these excerpts, please visualize the kind of women employes to whom they are addressed—women who are well educated and capable of meeting a wealthy clientele. These "Reasons for dismissal" are certainly phrased by someone without a sense of humor:—"Introduction, possession or use of habit-forming drugs, narcotics, or intoxicating liquors on the property of the store or reporting for duty under the influence of same"; "Carrying concealed weapons or the violation of any criminal law or conviction in any court of law" (One is convicted of overtime parking in a court of law); "Unbecoming conduct, bringing reflection or criticism upon the store and its personnel. Fighting or attempting bodily injury to another, inciting a fight or brawl or participation in such on store premises. Malicious mischief, neglect, or carelessness resulting in the injury of individuals or destruction of property of the store or others"; "leaving workplace or designated duties without permission or without proper relief. Being in or visiting in areas or locations in the store, other than locker rooms, employes' rooms, or public places when off duty, without proper authority or satisfactory explanation"; "Failure to use designated employes' store entrances and exits"; "Smoking or having open lights or fires except in designated areas."

Only employers who are sure they have no personnel problems could issue a booklet that reminds one of the tugboat captain who ordered the anchor heaved over the side—in spite of the fact that his crew tried to tell him the anchor chain was not attached. He was the boss.

There are many printed pamphlets, cards, signs through which management hurts the sensibilities of its workers. A short time ago, I passed by a sidewalk freight elevator shaft. Plainly visible from the street was the large sign "This elevator is dangerous—employes only." One might go on for pages, but every reader can compile a list of posted signs and printed policies that needlessly cause resentment. It would pay

corporations to send trained men around the entire premises to watch for—and remove—such causes of detrimental employe attitudes. It is a good investment to protect a worker's pride.

But the greatest single cause of lowered morale is the inconsiderate personal treatment an executive or supervisor accords a subordinate. And it usually reflects top management's attitude. Men's pride can be badly hurt in many different ways. An injury to pride is instantly reflected in attitudes that detract from morale. And that spells inferior workmanship, waste and decreased production.

There is the man who is eager to contribute more than a routine job to the welfare of his firm. He has observed a practice which he considers not as good as it might be. So he works out what he believes to be a better method. But when he broaches the subject to his superior in anticipation of a pat on the back, the executive dismisses it with, "Oh, that sounds all right. But it won't work. If you knew as much about this situation as the management does, you'd be able to see why it's not practical!" This reaction exposes the executive's inferiority complex. He takes the subordinate's suggestion as a personal criticism. So he gets even by pinning back the employe's ears.

These things stay with an employe. Last fall, I met a friend who is a technical representative for a large sales organization. Our conversation about his company troubles drifted around to original causes—the division manager. Several years before, the expert had repeatedly lost business for his employer because certain company policies prevented his meeting competition in the marine trade—where each sale involved extremely large orders. Carefully he analyzed every factor and organized them into definite problems and specific solutions. He worked another two weeks to get it into a typewritten report that was so complete it could have been followed like a blueprint.

When he walked into the division manager's office with this folio, the executive shoved it to one side without even looking at it—and began to tell him why it was useless to go into the matter. The expert requested that he at least look it over and make some suggestions. The manager didn't commit himself. Sometime later, when nothing had been said, my friend checked with intimates in the home office and found the report had never been forwarded by the division manager. He asked the manager about it and was told, "Hell, I haven't time to wade through it. Anyway, I'd just be wasting my time because they wouldn't consider it." An intelligent and loyal employe, who knew very well that his boss always had his golf clubs in the back of his business car, was then and there prejudiced against that executive and the company. He'll never forget that slight—and it will be a long time before the company again gets the advantage of his alertness and analysis. He'll carry out his routine work—and let it go at that. Furthermore, if the defense effort brings him a real offer because of his engineering background—his long-time employer will probably lose his services.

Many men rise because they are capable of doing things that are outstanding. Their abilities lift them head and shoulders above the average. Others try to climb by pushing the next man down. Unfortunately this is true of many executives. You can recognize the tendency in a number of ways. One obvious—and particularly dumb—method is when a sales manager, for example, tears up a salesman's order and then writes it up as his own. I've seen men who did that get promoted—which was a reflection on the intelligence of their supervising executives. The manager who is a little smarter, isn't quite so crass. He doesn't tear up his salesman's order—he sends it in with a note telling how he paved the way for his man.

There are still other ways of stepping on necks. Such an executive craves a feeling of superiority over his subordinates. So he constantly handles them in a way to make them realize he is the boss. A friend of mine, manager of an important sales branch, was once invited to play golf by the assistant district manager. The district manager was there, too. Later they rode into town together. The excitement of the game lingered with my friend, the branch manager, who turned to his chief and said, "You should have seen Harry swing at that ball when—"

The district manager coldly looked at him and asked, "Who did you say swung at that ball?"

The branch manager paled—then flushed. But he was a good soldier. "I was talking about Mr. Foster." What he said under his breath was excellent cavalry language. He broke away from the two executives as fast as he could. He has never forgotten nor forgiven that senseless rebuke.

It is surprising that when sincere consideration for a subordinate can so easily be shown—it is so often a sham that is instantly spotted by the employe. Or it may even be a direct slap in the face. There was, for example, the young corporation representative in a small community who asked the big out-of-town chief over to the house. He was very proud of their six

months' old son. "Before you go, Mr. Fairfield, I'd sure like to have you meet my wife and see our youngster."

The chief shook his head and said calmly—"I never go around kissing the babies!"

Fifteen years passed. That chief shot up the ladder until he was within two or three steps of the top of a great corporation. He hung there for several years. Then he slipped back. Thousands wondered why—but to that father the answer was clear. This executive, in spite of his brilliance in working out sales plans, did not understand the importance of industrial relations. Without that human understanding he failed to earn the enthusiastic co-operation of the thousands in his department. He was defeated because he was merely an executive and not a leader. Employes' morale soars when they can follow a leader; it drops when they must obey an executive.

In one corporation the morale in one department was high; in another it was low. There may be no connection, but it seems significant that in the department with high morale, every employe down to the roustabout at the bottom called the big chief by his first name. Every executive was called by first name. It was much like a big family. And those men worked like the devil for themselves and their chief. He was actually their leader.

In the other department where morale was low, every subordinate had to "mister" his superiors. I was once present when a subordinate executive was called "Bill" by one of his men when the chief was present. As soon as the employe had left, the division manager severely criticised his lieutenant for permitting his men to call him "Bill." "All right, Mr. Warner," Bill came back with a cheerful grin, "if you tell me they're to call me 'Mister'—I'll see that they do. But if you leave it to me, I'd prefer to have them call me 'Bill' because I can do a lot more with them that way."

"I'm not going to tell you they have to call you 'Mister' as long as you feel that way about it, Bill. But personally, I know it's a mistake when you don't make them respect you as the boss."

It wasn't a mistake, however, for Bill had one of the finest organizations in the whole division. And even Mr. Warner wasn't for the "Mister" principle all the way because he consistently and obviously called his general manager "Bruno." There are many firms that bristle with formality. Subordinates must "Mister" their superiors. But the latter call the subordinates by their first names—or plain "Smith." It's a bad—and costly—practice when it is merely a device for showing the subordinate his proper place.

I remember one executive who hired a man that had for years called him by first name. When he came to work he said, "Mr. Miller, now that I'm working for you I'd better stop calling you 'Jim.'"

"Suit yourself—but I'm glad to have you call me 'Jim.' And don't worry—if you pull some boners, I'll bawl you out just as hard whether you call me 'Jim' or 'Mister.' OK?"

That man would have gone to hell for his manager because the latter helped him to retain his self-respect. And his respect was tremendously greater for "Jim" than it would have been for "Mr. Miller." The "Mister" too often implies a stuffed shirt—which is something that no subordinate can possibly respect. Widespread "Mistering" is an expensive luxury for a corporation. Men, who will freely stop "Jim" to pass on some observation or suggestions, hesitate about stopping "Mr. Miller" in order to present helpful ideas. "Mr. Miller" has erected a wall around himself.

Whenever a company makes it difficult for its employes to offer suggestions, it suffers a heavy loss. Unfortunately, such losses do not show as red figures. Therefore few executives are capable of recognizing them. I recently made the rounds of "suggestion boxes" with the safety engineer of a plant which employs thousands. He told me when we started that we wouldn't find anything but that his conscience drove him to look, hopefully, each Saturday morning. As he unlocked each box, nothing was inside but undisturbed cobwebs. In the two months this safety engineer has been looking into them, there have been no suggestions.

That corporation thought enough of suggestion boxes and their use to put them up. They do not think enough about them to analyze the reasons why no suggestions are placed in them. If several thousand workers in a defense plant cannot collectively think up one suggestion in two months—there is something wrong. It calls for an investigation.

There are always reasons why men do not come up with excellent, money-making suggestions. However, when they do make one, if they receive a reward commensurate with the service possible in their suggestion, that is one satisfaction. But the real satisfaction that remains for years after the money has been spent is the appreciation and the recognition they have received for their idea or invention. If that idea is slighted or completely ignored, a resentment is built up which eventually harms both the man and his employer. The man

stops being alert, inventive; the firm loses because he has dropped back to average—to doing only the job for which he is paid.

This same corporation had a shearer who cut steel plates on a huge shearing machine that snips a sheet of steel as easily as scissors cut a sheet of paper. These sheets are marked with chalk at the cutting line. It used to require much time, because of poor visibility, to get the sheet exactly in line so it would be cut through on the chalk mark. Sometimes it took two men—one to look down in back and wave his hands something like a surveyor waves to his stakeman.

This young man had once worked in a factory where they had large mirrors at the corners of every building so truck drivers could look around those corners. He decided that a mirror would help him look around a corner and down on a chalk mark so he could stand at the machine in a normal position and see clearly when the mark was exactly under the cutting edge. He fastened a long strip of plate glass mirror to the face of the shearing machine at the correct angle to see that mark in line with the cutting edge. After he had it working, he gave the idea to the company instead of patenting it. They gave him ten dollars.

That mirror has been applied to all shearing machines. It enables each operator to save about half the time of getting the steel lined up for cutting. It has increased his output by more than 50 per cent. Multiply that by the several shearers and the days of a month, the months of a year. It means a large sum to the employer. But the man got only ten dollars. Furthermore, when he asked for a pay raise a short time ago, he received no immediate satisfaction although he was offered more by another defense contractor. Here the employer was in danger of killing a goose that had laid one golden egg, whereas he should have gone out of his way to encourage more golden eggs.

This has not happened because the employer is mean and grasping. It has happened because the management has not investigated the significance of this and similar occurrences. Management sees when it loses money on a purchase or on a contract. But the existing losses or possible gains due to detrimental employe attitudes either becoming worse or being improved are too "intangible." And the cobwebs continue undisturbed in suggestion boxes—

As I observed the man who had thought out a thousand dollar idea for his company, it struck me that his obvious resentment—he had in no uncertain terms asked for that pay increase—was not because he had received only ten dollars. His real resentment arose because the company had so undervalued his contribution to the firm's welfare. They had hurt his pride far more than they had hurt his pocketbook. He was giving them another chance to redeem themselves. Fortunately, his foreman recognized this man's possibilities and gave him a promotion. The young fellow, whose eyes had been somber a few days before, was frankly elated. He tapped the foreman's arm and said, "Boss, I'll sure do everything I can to show how much I appreciate what you've done for me!" With rare understanding, his boss answered—"You've done it for yourself, lad—by the way you use your head!" And that was the real payment for his invention—one that meant far more to him than a prize.

We all expand when we are appreciated and we resent it when we are not. That is the simple formula for employe morale. Give employes the chance to do something of which they can be proud. Then suitably recognize their accomplishment. And consistently treat them so they can face management and each other with clear eyes and raised chin.

The Simo-Graph

By MARTIN WIBERG

Instructor in Motion and Time Study, Armour College of Engineering
Division of Illinois Institute of Technology, Chicago

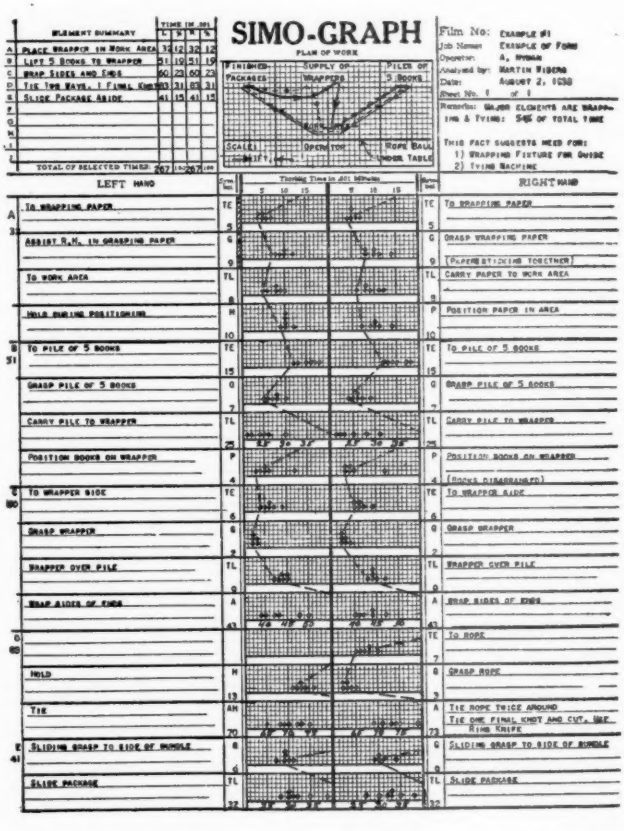
THE simo-graph is a new form for use in micro-motion analysis. Its main purpose is to record variations in time and thereby indicate changes in the method and details of performance.

The graphical arrangement of the time values condenses on one record all the filmed cycles. It shows the extent of uniformity, simultaneity and synchronization in the motion pattern; and when properly used has many advantages over present analysis sheets.[1] The simo-graph supplements the usual simo-chart as an educational device, as a research tool on basic motion times and as an engineering procedure for methods improvement. When used instead of an analysis sheet for constructing a simo-chart it makes for better presentation, analysis and comparison of methods.

The illustrations show the development of a summary simo-chart, representative of the present method, and a possibility simo-chart. Although actually improved without the use of a film, the simple method shown here is used to illustrate the principle and procedure of the simo-graph.

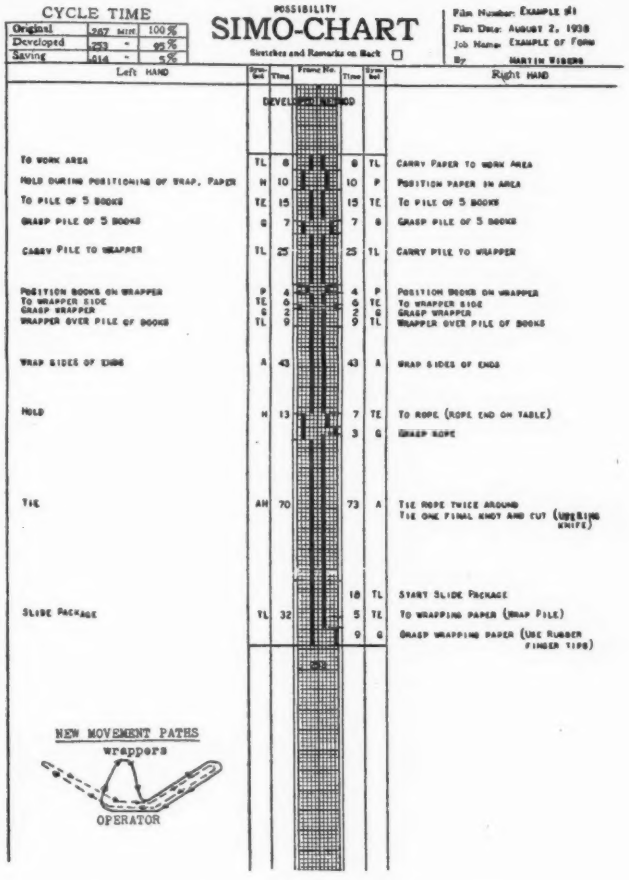
The upper left corner contains an element summary, in which preliminary time study data for setup, cycle and cleanup, may be shown to indicate the proportions of film cycle time to the total standard time. The latter is the proper basis for estimating costs and savings of methods work. The narrow column or line space alongside the graph areas is used to indicate (in color) the presence of delays and questionable times. Each dot within the graph area indicates a time value. Similar time values are shown one above another on the same vertical line, until the number of time values is recorded graphically. The vertical lines in the graph area indicate the value of the dots in accordance with the common scale above, shown in 1/1000 minutes. For time values over .020 minutes a larger scale must be shown in the blank space below the particular graph area.

The illustrated simo-graph was made as follows: The therblig, or motion element, for the left hand is noted as TE (transport empty) and is described as "to wrapping paper." The movement symbol, S, may be added to indicate that the therblig is performed by the shoulder. The time for this TE in the first cycle is .005 minutes, which is recorded as a dot accurately located within the adjoining graph area. This is followed by recording the next therblig and its time, until all times in the first cycle have been shown graphically. The remaining film cycles are similar to the first, except for the additional and sometimes different time values. For example, to refer to the first therblig, recorded as TE,



the cycles show time values of .005, .005, .004, .006, .007 and .004 minutes. The first value is located as a dot on the intersection of the vertical line (under 5 on the common scale above) with the first horizontal line

[1] See Barnes, Ralph M., "Analysis Sheet," *Motion and Time Study*, John Wiley & Sons, New York, 1937, pages 71-72, 76.
Also see Alford, L. P., Editor, "Transfer Sheet," *Cost and Production Handbook*, The Ronald Press, New York, 1934, page 576.

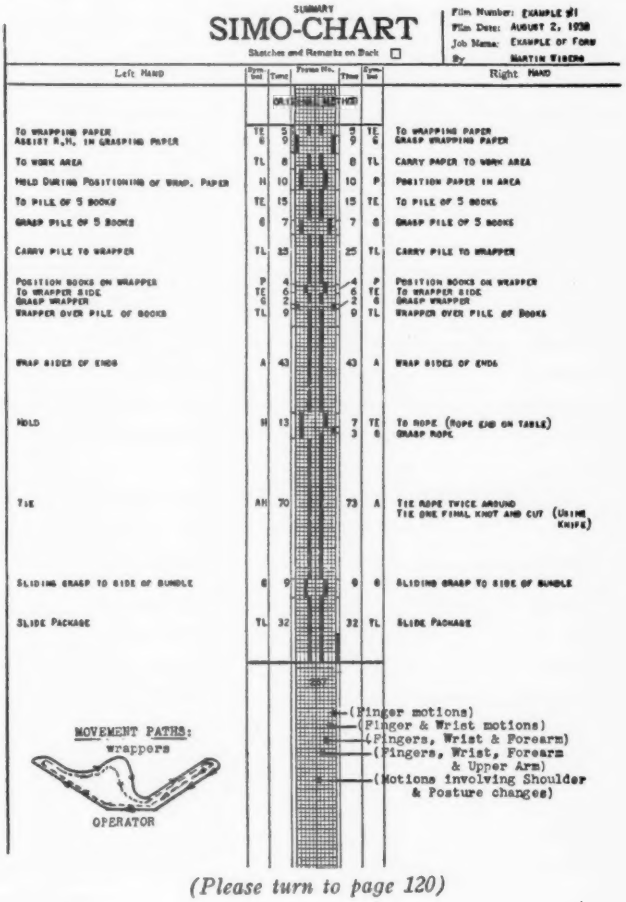


above the base line. When all these TE times are charted there will be two dots on the 4 line, two on the 5, one on the 6, and one on the 7 line. The range of times for this therblig, from .004 to .007 minutes, is now recorded. The causes for the variation in times should be found on the film, and recorded as a change in the kind, speed, direction or distance of the movements used. Once the common variations in time are found and recorded it is relatively easy to estimate or calculate the representative time value for each therblig. This value is noted on the simo-graph immediately below the respective symbol.

An additional graphic picture of the motion pattern is obtained by connecting lines in sequence between all the minimum time values. In case the graph areas have a changed time scale these lines are corrected to show the relative location of the minimum value. The resulting nearly parallel lines indicate the time characteristics of the motion pattern, such as regularity, rhythm and simultaneity. These connecting lines, however, are not so important as the dots. These dots show time variations, and usually indicate important variations in the details of method.

The completed simo-graph shows by means of the connecting lines that the particular motion pattern is quite simultaneous except for the therbligs in element D. A certain rhythm is also indicated by the breaks in time. The variations found in the details of the method may or may not be considered significant, depending upon the viewpoint. Referring again to the therblig TE, it has a time difference, or range, from .004 to .007 minutes. The maximum is 75 per cent higher than the minimum time. If this time difference is caused chiefly by method variations, a more detailed investigation may be profitable.

The advantages of the simo-graph lie in its practical and convenient summarization of all the therbligs and times found on the film. Every therblig on the film is recorded, not just those from a single cycle visually and arbitrarily selected. The therblig times for different operators can be summarized within the simo-graph area by the use of differently colored dots. Causes of



(Please turn to page 120)

Progress Report of Committee on Rating of Time Studies

TO THE members of The Society for the Advancement of Management and to industrial engineers generally:

The work of the Committee on Rating of Time Studies has reached a point which makes it desirable to issue a report of progress. The following progress report carries the approval of the Committee:

The Nature of the Problem

It has long been known that accuracy of time studies is strongly influenced by the accuracy of the observer's estimate of the performance of the operator under observation. It is generally agreed that the treatment of this problem in the literature has not been entirely adequate, due in part to the limited amount of data available. This same shortage of data has made it difficult to appraise the relative effectiveness of the various methods currently in use as this appraisal can hardly be expressed in words.

Organization of the Committee

The Committee on Rating of Time Studies is the result of a suggestion by Mr. J. K. Louden, then Supervisor of the Standards Control Division for Owens-Illinois Glass Company, to the effect ". . . . that a definite contribution the Society could make to the field of industrial engineering would be to set up a committee to work toward the establishment and determination of grading or rating standards for time study purposes." This suggestion was acted on by Mr. W. R. Mullee, Vice President in Charge of Time and Motion Study for the Society, and the following is the membership of the Committee:

PROFESSOR R. M. BARNES, Professor of Industrial Engineering, The State University of Iowa, Iowa City, Iowa.

MR. PHIL CARROLL, JR., Management Consultant, 9 Rockefeller Plaza, N. Y.

MR. J. M. JURAN, (Chairman), Manufacturing Engineer, Western Electric Company, 195 Broadway, New York, N. Y.

MR. J. K. LOUDEN, Director of Industrial Engineering, The National Supply Company, Grant Building, Pittsburgh, Pennsylvania.

MR. W. R. MULLEE, Supervisor of Engineering, American Hard Rubber Company, Butler, New Jersey.

PROFESSOR D. B. PORTER, Professor of Industrial Engineering, New York University, University Heights, N. Y.

MR. RALPH PRESGRAVE, General Manager, J. D. Woods & Company, Ltd., 70-74 Crawford Street, Toronto, Canada.

MR. G. J. STEGEMERTEN, Staff Supervisor, Time Study and Methods Department, Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pennsylvania.

MR. SANFORD E. THOMPSON, President, The Thompson and Lichtner Co., Inc., 620 Newbury Street, Boston, Mass.

Early Activities of the Committee

At the outset a "Statement for Discussion" was drafted and sent to all members, who gave comments by correspondence. From these comments a new statement was prepared and this formed the agenda for a meeting of the Committee held in New York in December, 1940.

At this meeting it was decided for the time being to confine the activities of the Committee to the area shown in Chart I, though it was recognized that such restriction omitted a sizable field of exploration.

Terminology

The Committee is as yet making no recommendations for standard terminology. However, for Committee discussion purposes, the following was agreed upon:

Rating is that process during which a time study engineer compares the performance of the operator under observation with the observer's own concept of proper performance. (Some refer to this process as performance rating.)

The *rating factor* is the result obtained by the observer upon making the rating. The rating factor is variously expressed as "efficiency," "point hour," "unit hour," "performance rating factor," etc.

Normalizing is the process of applying the rating factor to adjust the time study data to the observer's concept of performance. (This process is variously called rationalizing, leveling, etc.)

It is considered that *instantaneous performance* is to be rated rather than performance judged on the basis of how long the pace can be maintained. It is considered that the determination of amount of relax or fatigue

time to be added is a determination independent of the rating of instantaneous performance. The Committee's investigations include an inquiry into the variations in determination of amount of relax percentage.

Method is considered to be the combination of the *setup* or physical job layout together with the prescribed *motion pattern*. Since theoretically these are determined by the engineer, it is considered that they are not related to the operator's performance.

Concept of Standard Distinguished from Estimate of Performance Relative to That Concept of Standard

This is one of the first distinctions made by the Committee. Suppose that observers A and B see the same individual doing the operation of walking. Observer A rates the operator as 100 per cent of standard. Observer B rates the operator at 80 per cent of standard. This difference could have arisen from:

(1) A difference in concept of standard. Observer A might have a concept of standard of 2.4 miles an hour for walking, and observer B a concept of 3 miles an hour. If this were so, both of them estimated the speed of the operator as 2.4 miles per hour, and their difference in rating factor arises purely from their difference in concept of standard.

(2) A difference in judgment of operator's performance. Both observers might have a concept of standard of 3 miles an hour. In such case the difference in rating factor would be the result of difference in judgment of operator performance relative to the same standard.

(3) A difference both in concept of standard and in judgment of operator performance. This is a combination of cases (1) and (2).

The Committee has determined to concentrate on the study of differences in concept of standard. This involves having many observers view the same operation. The observers will be told what is the actual rate of output and will be asked to state what, in their opinion, *ought to be* the rate of output. (The Committee decided to have the "ought to be" figures expressed in rate of output to avoid the complications arising from the existence of different ways of expressing the rating factor, such as per cent efficiency, B hour, "Manit," etc.) Inasmuch as all observers will start with identical data on what *is* the actual rate of output, the differences in their concept of what *ought* to be the rate of output will be due purely to differences in their concept of standard.

The Committee will also endeavor to study differences in judgment of operator performance other than those due to concept of standard performance. Such a study requires that the same observer see several speeds of the same operation, and record his estimate of the differences in speed.

Study of Differences in Concept of Standard

To study these the Committee will obtain the judgments of many engineers on a selected series of motion picture loops, each portraying a common hand operation in industry. Normally each loop will contain several cycles of the operation, simulating conditions encountered in practical time study.

The films are to be submitted to engineers with an instruction somewhat as shown in Appendix "A." It will be noted from this instruction that much supplemental data of value in standardization will be obtained.

Preparation of Films to be Standards of Operator Performance

It is hoped that analysis of the data contained in the returns of these studies will permit selection of a set of films which can be used by industry as reference standards for concept of operator performance. For such films it would be known what, in the opinion of the industrial engineering profession, ought to be the rate of output. Such films could be of value in:

Judging the extent to which the concept of standard performance in any organization may compare with the concept used in industry generally.

Keeping time study engineers tuned to a constant concept of standard.

Training new time study engineers.

Providing an objective standard for reference.

Study of Differences in Estimate of Operator Performance Exclusive of Differences in Concept of Standard

The films to be viewed by the engineers will normally contain an assortment of cycles, at different speeds, of the same operation. On some of these films the observers will be requested to estimate the performance on these cycles with respect to several "known" cycles on which the performance of the operators will be made known to the observers.

This experiment will yield data as to the ability of engineers to establish rating factors in direct ratio to speed of operator performance. These data will be valuable in appraising the present state of the art. It is

hoped that the films will likewise be useful as reference standards and for training purposes in estimating operator performance.

Differences in Standard Data as Established by Different Companies for the Same Operation

One committee member has suggested an extension of the investigation whereby a number of companies will each establish standard data from films of the same operation done by several operators. Many important variables can be studied from such an investigation. This suggestion will be further considered by the Committee.

Rating from Films vs. Rating in Three Dimensions

Whether rating from films is a proper test of ability to rate in actual shop practice and whether film standards would be suitable for shop use, is not precisely known. The Committee generally has felt that rating on films would be entirely satisfactory. However, experiments will be conducted by parallel studies both on films and three dimensions for the same operation, to test this hypothesis.

Securing the Man-Hours of Engineering Effort Required to Carry Out the Project

To those who have read this far it must be obvious that there is much detailed work associated with a study of this type. Fortunately, however, it seems clear that the Committee will be able, through the generosity of several progressive industrial organizations, to secure the engineering effort necessary to carry on.

Contact with Participating Companies

Attached as Appendix "B" is a draft of a letter of the type to be sent to companies who will be asked to supply films.

Duration of the Study

This study is a long-range project and involves the co-operation of many busy men. It is clear that in terms of urgency this study is, to most of those involved, at some distance down the list. Furthermore, the Committee itself has been disposed to make haste slowly rather than to come to precipitous conclusions.

Accordingly, it seems doubtful that a completion date before the end of 1942 can be hoped for. The Committee will from time to time make a report of its progress. The Committee likewise hopes that as it becomes necessary to call on industry and on the engineering schools for further assistance and collaboration, the response will be as wholehearted as it has been to date.

R. M. BARNES,
PHIL CARROLL, JR.
J. M. JURAN, *Chairman,*
J. K. LOUDEN,
W. R. MULLEE,
D. B. PORTER,
RALPH PRESGRAVE,
G. J. STEGEMERTEN,
SANFORD E. THOMPSON.

Appendix A

INSTRUCTION TO RATERS

The operator shown in this film is producing at the rate of _____ parts per minute which is the average of _____ cycles shown in the loop.

The	time	for	the	first	cycle	is	_____	minutes.
"	"	"	"	second	"	"	_____	"
"	"	"	"	third	"	"	_____	"
"	"	"	"	fourth	"	"	_____	"
"	"	"	"	fifth	"	"	_____	"
"	"	"	"	sixth	"	"	_____	"
"	"	"	"	seventh	"	"	_____	"
"	"	"	"	eighth	"	"	_____	"
"	"	"	"	ninth	"	"	_____	"
"	"	"	"	tenth	"	"	_____	"

Other pertinent information with respect to this operation is as follows:

_____

_____

_____

What, in your opinion, *ought* to be the output on this operation, of an average experienced operator working on incentive for a working day of 8 hours, after making allowances for personal time, fatigue, and any other factors you consider proper? Assume that this operation constitutes the entire day's work and that there is no need for any setup, lubrication, etc., other than is shown in the film itself. Assume the method in use in this operation is satisfactory.

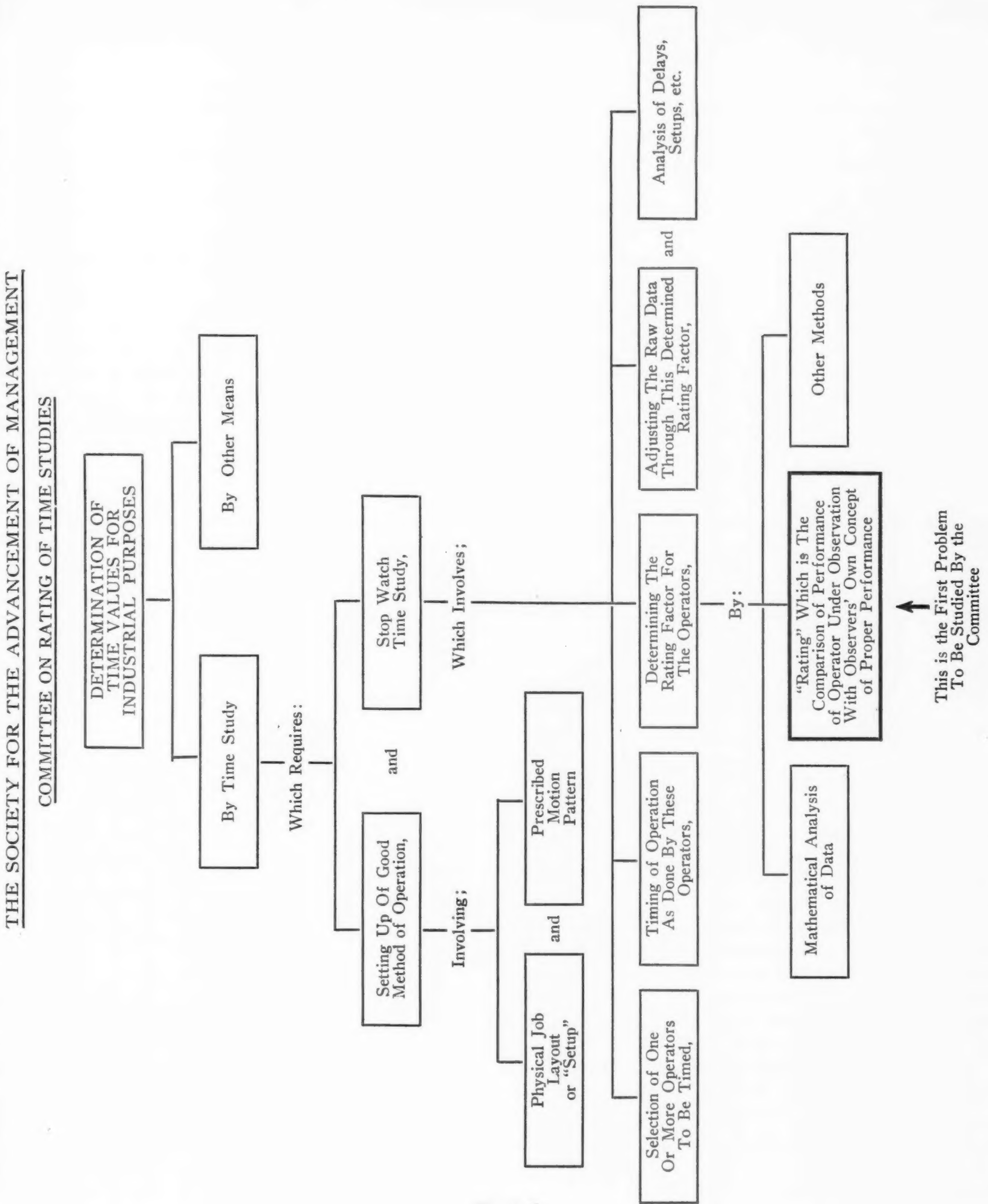

THE SOCIETY FOR THE ADVANCEMENT OF MANAGEMENT
COMMITTEE ON RATING OF TIME STUDIES
DETERMINATION OF TIME VALUES FOR INDUSTRIAL PURPOSES
By Time Study
By Other Means
Which Requires:
Setting Up Of Good Method of Operation,
and
Stop Watch Time Study,
Involving;
Physical Job Layout or "Setup"
and
Prescribed Motion Pattern
Which Involves;
Selection of One Or More Operators To Be Timed,
Timing of Operation As Done By These Operators,
Determining The Rating Factor For The Operators,
Adjusting The Raw Data Through This Determined Rating Factor,
and
Analysis of Delays, Setups, etc.
By:
Mathematical Analysis of Data
"Rating" Which is The Comparison of Performance of Operator Under Observation With Observers' Own Concept of Proper Performance
Other Methods
This is the First Problem To Be Studied By the Committee

Chart 1

Please list the allowances you have made.

Personal time _____ minutes out of 8 hours.

Fatigue _____ minutes out of 8 hours.

Any other allowances (specify)

Purpose of Allowance	*Minutes Allowed out of 8 Hours*
(a)	
(b)	
(c)	
(d)	

Rate by elements if you so desire.

Please describe the rating method or system by means of which you have arrived at these results. If you use a prepared form in this connection, please attach it.

By average experienced operator is meant the average which might be expected of a large group of operators working on incentive for a period of time sufficient to become thoroughly familiar with the job.

If you have some other concept of operator in making your rating, please state what is your concept.

Appendix B

Draft of Letter Requesting Films From Participating Companies

One of the most important procedures during the conduct of a time study is the estimate by the observer of the performance of the operator under observation. This estimate is subjective in nature and is dependent upon the judgment of the observer. To date there have been no large-scale efforts to improve this technique by giving to the observer objective standards for judging operator performance. It is perhaps unreasonable to expect that any one organization should have solved this problem, which is really a problem for solution by the entire industrial engineering profession.

Recently there has been organized in The Society for the Advancement of Management, a Committee on Standardizing the Rating of Time Studies. It is the purpose of this Committee to study the problem of rating of operator performance and to find means of improving the present techniques.

As the result of its deliberations the Committee has concluded that it would be most desirable to obtain, through the medium of moving picture films, the judgment of many time study engineers on the performance of a number of operators performing a variety of operations. To accomplish this requires four steps:

(1) Preparation of a series of moving picture loops representing the performance of a number of operations frequently encountered in industry.

(2) Routing of these films to many industrial engineers to obtain their rating of the performance of the operators in the films.

(3) Analysis of the resultant data.

(4) Use of these films as standards for rating, should the data disclose that they can be used for such purposes.

Steps (1) and (2) above necessarily involve the co-operation of the leading industrial organizations in the country. We are accordingly asking that you join with us in this study, first, by contributing several moving picture films which can be used for conducting the investigation and, second, by co-operating with us in having your time study engineers rate the various films which will be collected from the co-operating companies.

A specification as to the type of film which is considered suitable for this purpose is attached herewith. A general statement of the manner of collecting the opinions subsequently is also attached herewith.

We wish to give you every assurance that in all stages of the investigation the work will be done on an anonymous basis so that there can be no indentification either of the source of the films or of the source of the data.

Should you desire further information you can obtain it from any of the Committee.

STANDARDIZATION OF RATING OF TIME STUDIES

Specification for Films Submitted as Proposed Standards

The following requirements are considered essential characteristics of any films to be used to establish a standard concept of operator performance and to determine the degree of accuracy or effectiveness in rating by obtaining estimates from many time study engineers.

Size and Copies

Films to be submitted to the Committee shall be 16mm safety film. It is desirable that each co-operating company retain the original copy of the films submitted, this original to be used for making replacements should the film submitted be damaged or lost in transit from one company to another. Also it will be desirable to have such unused copy available from which to prepare the final standards.

Identification

No company identification need be spliced into the film by the participating companies. A suitable code for Committee reference purposes will be added by the Committee.

Speed of Taking Pictures

In case of cameras having a selection of several speeds, the pictures shall be taken at the nominal speed of 16 frames per second. Cameras driven by synchronous motors shall have pictures taken at that nominal speed closest to 960 frames per minute.

In addition, a micro-chronometer, or clock, shall be included in the field of the picture. This is intended to serve later as a guide in maintaining the projection speed at the same rate as the actual performance.

Subject Matter in the Films

To be suitable for Committee purposes the operations on the films should meet the following requirements:

1. Operations must have a predominance of simple manually controlled movements; that is, most of the cycle must be manual and not machine time and the operation must not involve a high degree of dexterity difficult to evaluate without studying the job itself.

2. Operations must require a minimum of judgment, planning, or other mental processes, hence such operations as visual inspection (requiring judgment), adjusting, polishing, straightening, layout work, etc., are not desired.

3. Only those operations which are common to most machine or assembly industries and would, therefore, be familiar to any experienced time study engineer in those industries shall be submitted. Such operations, which will be of an unskilled or semi-skilled nature, involve:

Simple Assemblies
Loading and Unloading
Sensitive Drill Presses
Hand-Fed Punch Presses, Kick Presses, Air Presses, Hand Shears, etc.
Labeling or Stamping—Not Requiring Accurate Alignment
Burring on Chuck Motor or Grinding Wheel, etc.
Gaging, such as "Go" and "No-Go" Gage, etc.
Dipping, Stacking, Racking
Spot Welding, Riveting
Transporting (Limited Area not Restricted)
Packing and Packaging
Bench Core Making
Any Other Similar Operation

4. Operations should be actual shop operations and not laboratory experiments.

5. The physical setup of the operation (layout of tools, etc.) and the motion pattern of the operator should be well engineered.

Cycles

1. Each loop or reel of film should cover about 10 cycles of the operation as performed by one operator. For some of the studies to be made it will be desirable to have more than one loop each involving more than one operator.

2. The maximum time per cycle shall not exceed approximately .40 minute.

Comment

(Continued from page 97)

distinguished servants of the public good who were long loyal members of this Society and its predecessors. With real satisfaction in their distinguished contributions we call attention gladly to the record of this work while regretting deeply the cutting off of two splendid careers. John H. Williams and Frank B. Copley—each for quite different reasons—will enjoy prominent places in management's hall of fame.

* * * *

One of the educational purposes of our Society is well served, and one of the ways of interesting others in membership with us is forwarded, by the use of reprints of articles from this Journal for use among business friends or in university classes. We invite such use of our material and offer such reprints in quantity at as reasonable a price as possible. From the last issue of ADVANCED MANAGEMENT around 2500 reprints of one or another article were distributed.

ORDWAY TEAD.

John Howell Williams

January 22, 1873 **May 23, 1941**

The younger members of SAM very likely did not know John Williams, because for the past ten years impaired health had restricted his professional activity. Older members, however, will remember him as one of the creative minds of the management movement. In fact, his development of the flexible budget as an instrument of Scientific Management in general administrative control is probably the outstanding contribution in that particular field.

John came up the hard way; in the school of hard knocks and without benefit of formal professional training. At the age of sixteen, he with an equally youthful friend, started a printing business with a $3 hand press, on the third floor of the friend's home in Baltimore. With hard work the small business prospered and the hand press was replaced by a power press located in a three-story building "down town." Shortly thereafter this enterprise evolved into Williams, Wilkins & Co., which became the leading establishment of its kind in Baltimore. This establishment is today one of the best examples of Scientific Management to be found in the printing industry.

From the beginning he manifested an especial interest in management as a technique and, although he was not in these early days acquainted with the literature, instinctively he laid a foundation for subsequent development of scientific management in the Williams, Wilkins & Co. organization. In 1900 he came to New York where he was for a period identified with one or another phase of the printing business. His interest in management soon led him into more specialized activity, and about 1907 he went with the Trust Company of America as investigator of new enterprises that were applicants for loans. From this work it was only a step to professional service as a consultant in management. During World War I he was in charge of organization and methods in the Quartermaster's Corps, and in 1921 became New York manager for Day & Zimmerman, Inc., of Philadelphia.

This experience in the school of hard knocks had its plus values and its minus values. It made of Williams a rugged, energetic individualist who depended on no one other than himself; it taught him to recognize, evaluate and adhere to the facts of a managerial situation; made him an outstandingly honorable and dependable personality. But this very dependence on himself deprived the management movement of a complete formulation of his contributions to it, for the demands of obligations to clients never permitted sufficient freedom for the necessary writing and speaking.

The first of Williams' major contributions was his concept of visualization of management,—a concept never fully explained and too involved for discussion here. Williams' own statements are to be found in articles, "The Index as a Factor in Industry," in *Bulletin of the Taylor Society,* Volume I, No. 3, May 1915, page 2 and Volume II, No. 2, July 1916, page 6. The essence of Williams' idea is "that management is a branch of engineering. . . . fairly entitled to recognition as a science. . . . (and to) some tangible means of expressing its product in *form* as well as *result*. . . . comparable in vividness and concreteness to drawing in mechanical engineering."

The second of Williams' contributions, the one most completely expounded, is his concept of the flexible budget. The first statements of this concept, all in *Bulletin of the Taylor Society,* were "A Technique for the Chief Executive," Volume VII, No. 2, April 1922; "The Ways and Means of the Chief Executive," Volume VIII, No. 2, April 1923; "Management as an Executive Function," Volume IX, No. 2, April 1924; "Top Control," Volume XI, No. 4, October 1926; and "The Budget as a Medium of Executive Leadership," Volume XIII, No. 4, August 1928. The final statement appeared as "The Flexible Budget," McGraw-Hill, New York, 1934. Of this contribution we can take the space only to observe that in our judgment Williams' is the most practicable and effective integration of accounting and budgetary techniques into that of Scientific Management for purposes of general administrative control that has been developed.

The third outstanding contribution of John Williams is not a matter of public record; it is an administrative document in the files of a public agency. In consequence of impressive testimony by him at a hearing of the Interstate Commerce Commission in June, 1928, on the applicability of current cost-finding practices to the railroad field, Williams was retained by the Commission

to make an intensive study and report. The essence of Williams' findings, supported by a concrete procedure, was that from both an accounting and an operating standpoint it is possible for the steam railroads to obtain over-all service costs comparable to over-all product costs commonly obtained in private enterprises; and that, as in private enterprises, these over-all costs—although they could have little direct effect on ordinary economies, which must be effected through the use of time studies and budgets in terms of a given performance or person or thing—will give the information necessary for policy determinations and general programs. This report had an influence in the establishment of a cost-finding section in the I.C.C.

To those who knew John Williams intimately no account of his life is complete without some reference to his unusually charming personality. He was ever a loyal and appreciative friend, sensitive to beauty in every form, tolerant in argument, original in his mental processes, and with a courage in meeting life's vicissitudes that will continue to be an inspiration.

The ranks of pioneer, creative Scientific Management engineers are becoming thin.

MORRIS L. COOKE and H. S. PERSON.

Frank Barkley Copley

April 17, 1875 **January 14, 1941**

The Eastern Rate Case hearings before the Interstate Commerce Commission during the winter of 1910-1911 brought Scientific Management to public attention. Not only the striking content of the testimony but also the descriptive term *Scientific Management,* devised for use at the hearings, had definite news value. The newspapers of the period gave unusual attention to the proceedings, and monthly magazines presented articles on this, to them, new thing called Scientific Management.

Frank B. Copley, a special writer for the *American Magazine,* wrote articles on Scientific Management which Frederick W. Taylor himself appraised as the most understanding he had seen. After Taylor's death in 1915 Copley wrote an article on Taylor and his work for the *Outlook.* This article reminded a committee appointed to arrange for a biography of the father of Scientific Management of Taylor's appraisal of the earlier *American Magazine* article. Thus developed the circumstances that led to the selection of Frank B. Copley as the biographer of Taylor.

Copley's work on the biography was begun in 1916 and was not completed until 1922; it was published by Harper & Brothers in 1923. It was a labor characterized by utmost pains in the assembly of data. Not only were the Taylor files examined and appraised minutely, and all business and professional associates and acquaintances of Taylor interviewed in great detail, but even the surviving workmen with whom Taylor had had friction as gang boss at Midvale in the early eighties were sought out and interviewed. The result of such painstaking work was a biography of extraordinary penetration into the subject's acts and motives, and into their meaning and consequences. The first volume of the work still remains among the best expositions of Scientific Management.

Copley was a most arresting and interesting personality. Tall and slender, with strong, rugged features and a great shock of hair, he had a physical personality that reflected the artistic temperament that possessed him. Intellectual curiosity never left him; he read widely, thought with individuality and originality, and enjoyed nothing more than argument by the hour. He was a self-made man; born in lower Manhattan of early pioneer stock that had moved to the city from Orange County, he left school at the age of eleven and worked for a living from that youthful age on. As a small boy he sold newspapers; in his teens he was a runner for a broker's office; then by some capacity that overcame the obstacle of an impediment of speech, he became a reporter. At one time or another he served New York City newspapers,—the *World, Evening World, Sun* and *Journal.* Eventually he became a special writer for newspapers and monthly magazines, a field of work to which he did not return after completing the biography of Taylor. At the time of his death he had several manuscripts for books under way.

H. S. PERSON.

REVIEWS

Business Organization and Management. By Elmore Petersen and E. Grosvenor Plowman, Richard D. Irwin, Inc., Chicago, 1941, pages xv, 691. ($4.00.)

Reviewed by C. L. JAMISON, *Professor of Business Policy, University of Michigan.*

Here is a new textbook which covers the field of organization and management in five sections. The first section includes an introductory chapter on the historical background of business which has value in fitting the minds of young students for the intricacies which follow. Chapter II is a chapter of definitions, a treatment which the author defends as preferable to scattering the definitions throughout the entire volume. The remaining chapter in section I deals with the executive and his activities. It is an interesting chapter and presents ideas not found elsewhere in the book. But for that, the lay reader might well omit section I.

Section II deals with the theory and practice of organization. In six chapters of this section the author has presented with lucid analysis the principal concepts of organization which have been promulgated to date.

Section III deals with the process of management, starting with the board of directors. Management consists of policy formation and execution. These two concepts are treated in this section with painstaking thoroughness and clarity. A chapter on effective leadership and another on incentives may be out of place in this section, but they are well written and certainly belong some place in the book.

Section IV has two chapters, one on self-government through trade associations, a worth-while contribution, and another chapter on public administration, which may be reviewed with mixed emotions. Students of management should have some knowledge of the points of similarity and of difference between private administration and public administration, but it is doubtful if one chapter can cover the subject adequately.

Section V is entitled "Beginning an Executive Career." For youthful students it has inspirational value. For the lay reader it may well be omitted.

After each chapter is a list of well-constructed questions. In the appendix there are ten comprehensive cases. There is a complete bibliography. On the whole the book is a welcome addition to the literature of management.

Design for Industrial Co-ordination, A Technique for Co-ordinating the Primary Functions in the Field of Industrial Organization. By Robert W. Porter, Harper & Brothers, New York and London, 1941, pages xv, 249. ($3.00.)

Reviewed by HARRY ARTHUR HOPF, *Senior Partner, H. A. Hopf and Company, Management Engineers, New York; President, Hopf Institute of Management, Ossining, New York.*

Since the days when the doctrines of Taylor and his disciples were launched with dramatic suddenness upon an astonished world, a number of attempts—both co-operative and individual—have been made to prepare comprehensive definitions of the terminology of management and to establish codification of its principles. Those efforts of the co-operative type which were of American origin have thus far resulted abortively; European countries, among which England, France and Germany should be specifically mentioned, have done much better, as witness Lee's "Dictionary of Industrial Administration," the "Dictionnaire de l'Organisation et de la Science du Travail" of the Comité National de l'Organisation Française, and Nicklisch's "Handwörterbuch der Betriebswirtschaft."

When, on the other hand, we consider individual attempts, the literatures of many countries contain noteworthy contributions along these lines. Among the neo-classical writings there may be singled out for specific mention, "Science and Practice of Management," by A. Hamilton Church, 1914; "Administration Industrielle et Générale," by Henri Fayol, 1916; "The Philosophy of Management," by Oliver Sheldon, 1923; "Allgemeine Organisationslehre: Tektologie," by A. Bogdanow, 1926-1928; "Laws of Management," by Leon P. Alford, 1928. In more recent years, the writings of such distinguished students of management as Lyndall Urwick, Chester I. Barnard, Ralph C. Davis, Mooney and Reiley, Anderson and Schwenning, and again Leon P. Alford, should be emphasized to support the statement that there is no dearth of material available out of which to fashion standardization of terms and codification of principles in the field of management.

And now Mr. Robert W. Porter, author of the book under review, declares it his purpose to "discuss the design of industrial co-ordination, and describe how and why the processes of business unite to form a balanced unit of production" (see Preface, page xiii). Finding no text that attempted to penetrate this important subject in the manner in which he viewed it, he has undertaken to meet this alleged lacuma by writing a book which, he candidly states, "is a reflection of experience and does not pretend to be a scholarly compromise of divergent opinions" (see Preface, page xv). Accordingly, he dispenses with documentation, bibliography and references to recognized leaders of thought in the field he sets out to cover.

In order to accomplish his objective, the author introduces into his discussion "48 parts of organization to handle 37 phases of administration in conformity with the requirements of 21 elements of co-ordination" (see page 232). Moreover, when dealing with the subject of "leadership traits qualifying industrial co-ordination" (see Chapter IX, pages 165-183), he lists and defines 85 such traits, which he credits to Roget's "Thesaurus." The stage of synthesis is arrived at by the graphic presentation and discussion of a master-design of industrial co-ordination (see page 131).

Employment by the author of 191 specific terms of varying significance constitutes but a beginning in the evolution of his theme. In expounding it, he reveals a remarkable penchant for applying the rule of three to the language in which he clothes his explanations. His text literally abounds with triads; a sampling process applied to its 240 pages establishes the fact that an estimate of 676 such instances is well within the realm of probability. Moreover, the author is prolific and prolix in introducing combinations of his terms and in supplying substitutions for explanatory purposes.

After several attentive readings of the book, the reviewer has come to the conclusion that it may fairly be characterized, not as a contribution to advancement of the science of management, but rather as an excursion into the field of semasiology.

Judged from that point of view, one cannot help wondering why the author chose to dip into the reservoir of his own vocabulary instead of making use of the relatively rich and surely somewhat standardized material that exploration of the publications of writers such as those cited above would have made available to him for purposes of interpretation.

Preferring apparently to be free from any intellectual obligation to others, the author has fashioned, with originality and boldness, a concept of industrial co-ordination which has every appearance of being a finished product. With the assurance of a master of the game of chess, he has moved his words and phrases into their appointed positions in his matrix, and has evolved a design so symmetrical and neat that it challenges modification or compromise. His ingenious accomplishment he credits with such potency as to predict (see page 240) that, by harmonizing and energizing its constituent elements, "America can satisfy its present and indicated trends, measure up to the demands of national defense, bring unemployment under control and enlist surplus working capital effectively."

Throughout the book, the author displays a marked tendency to become doctrinaire with regard to the function of management; the virility which he seeks to impart to his expressed views and conclusions is seldom, if ever, exposed to the influence of qualifying observations. His faith in his design is so great that he apparently believes it to be equally applicable to small, medium-sized and large industrial organizations; considerations pertaining to the optimum cannot be discovered as entering into his philosophy.

"Design for Industrial Co-ordination" should be read by students of management, not for what it may be expected to contribute toward enrichment of their understanding, but primarily to enable them to become thoroughly familiar with the extent to which a multiplicity of words and concepts, derived from unverifiable experience, may on occasion be regimented in an endeavor to define the substance of management. From such a perusal they would doubtless obtain a renewed appreciation of the values inherent in simplicity and the semantic disciplines.

How to Work with People, Scientific Methods of Securing Co-operation. By Sumner Harwood, Cambridge Analytical Services, Cambridge, Massachusetts, 1940, pages 197. ($2.50.)

Reviewed by N. I. STONE, *Director, National Bureau of Economic Research, New York.*

"In this volume we set forth the theory of cooperation and its application to everyday living. We develop and make practical use of a new science," so announces the author in the introduction (page 11-12). The book carries a promising subtitle: "Scientific Methods of Securing Cooperation." In the concluding "Statement by the Author" we are informed that the work is the result of eight years of research work.

A patient perusal of the book discloses a string of twelve chapters full of well-worn maxims under headings of "cooperation," "understanding," "obligation and coercion," "incentives," "toleration," etc.

One interested in the subject of "How to work with people" in industry seeks in vain for helpful application of the copybook maxims to the problems of industrial relations.

After being advised in earlier chapters on the subject of the co-operative spirit and proper incentives to secure willing and helpful co-operation from members of an organization, we are told in the chapter on "Group Power and Organization" that "between management and employees there are relatively few matters that require understanding and agreement" (page 156) that "the various employees have ordinary technical skills and they are replaceable; therefore, only the usual rate of wage need be paid them, and no firm pays more than it needs to obtain the services of easily replaceable employees." (page 157). "If in the garment industry all firms are sweatshops, there is not much chance for a firm not a sweatshop to survive" (page 159).

The author's unawareness of progressive developments in the field of industrial relations, of the dollar-and-cents value of incentives furnished by higher than prevailing market wages, through profit sharing, bonuses, participation in management, etc., is apparent.

Practical Budget Procedure. By John H. MacDonald, Prentice-Hall, Inc., New York, pages xvii, 326. ($4.00.)

Reviewed by CHARLES REITELL, *Stevenson, Jordan & Harrison, New York.*

This book makes a specific appeal to those whose responsibility is linked with budgetary procedures. I say this first, because of the clarity and breadth shown by the author in setting forth the fundamental principles and second, because of the presentation of much descriptive material which clearly illustrates the methods of putting basic principles into operation. His methods material carries the additional merit of being drawn from industries where the illustrated procedures are in use.

Excellent treatment is made of every phase of budgetary activity. Particular attention, however, should be called to the next to the last chapter of the book on "The Budget Manual." In describing the purpose and use of such a manual, again, much illustrative material is used to show what specific enterprises are doing in the way of the construction and use of manuals.

The author has limited his treatise to budgetary control for industrial and commercial establishments. He leaves untouched budget principles and procedures covering governmental divisions such as municipalities, state and federal governments. Also, the large range of budgetary work involved in educational institutions, hospitals, and the like is not considered.

The author might have enhanced the value of his treatise had he given more space to the procedures for making the budget function. He devoted twelve pages of his book to what he calls "Working The Plan," as compared with three hundred and six pages to "Planning The Work," which leaves much unsaid as to the value of budgets in use. For example, many case studies are needed to develop the budget responsibilities for foremen. After all, foremen are really the responsible ones for the major expenditures in the production side of a company. Labor performance, the use of supplies, power and many other overheads come within foreman control.

The more foremen can be put on a measured flexible control the greater will be the profit value of the budget.

The only discordant note in the whole book is the small space given to flexible budgets. American industry stimulated to high pitch by defense work is constantly being forced to operate on activity ratios far above normal. In contrast other non-essential plants will be compelled to curtail activity to low rates of operation. Costs and expenses behave very differently at these over and under normal volume levels. Adjusted budget allowances for these different activity ratios appear important. Unfortunately, the reader will find rather scant treatment of this flexible phase of budgetary activity.

All in all, however, Mr. MacDonald has given us a very practical, comprehensive treatment. It is a real book on budgets for those responsible for establishing budgets as well as for those who must operate under their guidance and influence.

How to Select and Direct the Office Staff. By Edward A. Richards and Edward B. Rubin, Harper & Brothers, New York and London, 1941, pages ix, 179 ($2.50.)

Reviewed by RITA H. HOPF, *Partner, H. A. Hopf and Company, Management Engineers, New York.*

The subtitle of this book is revealing, "A Manual for Everyone Who Hires Office Employes." In other words, the book attempts to be all things to all who, as a part of their managerial activity, hire office help. Yet on page one it specifically addresses itself to the "average businessman" who, it is said, has "all of the responsibilities of hiring, supervising and firing added to his other administrative burdens, because his business volume is not great enough to warrant employing a full-time employment person."

This mythical average businessman, the book sets out to help in a dozen "highly practical matters," which may be summarized as follows: standards for stenographic and clerical jobs; sources of personnel; application blanks; tests for typists and clerical employes; interpretation of test scores; conduct of interviews; instruction of new employes; progressive personnel principles; wage incentive methods; criteria for promotions; procedure relating to discharges; and finally, common management problems as they relate to good personnel practice.

This rather ambitious program is realized in distinctly uneven fashion because the authors, quite understandably, have had difficulty in orienting their approach. At one moment they address the average businessman as though he were something of a moron, telling him how to develop a little speech to greet applicants, while at another they provide him with a chapter on job classification scaled to an organization far larger than any for which the average businessman—or even an exceptional one—could act as his own employment manager, not to say job analyst. One shudders to think what would become of the functions of production, distribution and administration while this average businessman occupied himself with classifying jobs into such categories as B2 Credit Office 69-119, Comb. X2 B285. Nor can this reviewer picture the businessman testing applicants with Otis, Stalnaker, Blackstone and Benge tests, among others, perhaps while waiting for a priority ruling from Washington or for an ultimatum in a trade-union dispute.

What this book does is to skim the surface of personnel practice, offering, it should be said, thoroughly sound advice in most respects. Notable omissions are the lack of any reference to the subjects of employe rating or office manuals, to the existence of the National Clerical Ability Tests, directed by a joint committee of the National Office Management Association and the National Council for Business Education, or to any of the literature of personnel management. In view of its sketchy treatment of many important personnel activities, the book would have rendered the average businessman a much greater service had it included brief bibliographies at the end of each chapter, or at least acknowledged in footnotes that the subjects discussed have been more adequately treated by others.

As a popular compendium on personnel policies and practice this book will doubtless find a large audience, but it is hardly to be commended to the members of this Society, who, it is to be hoped, have long been familiar with the ground it covers.

Training Workers and Supervisors. By Charles Reitell, The Ronald Press Company, New York, 1941, pages xiii, 182. ($1.50.)

Reviewed by ORDWAY TEAD, *Editor, Economic Books, Harper & Brothers, New York.*

This book is tailored to a specific need—that of rapid, intensive training of supervisory workers in defense industries. It is well tailored and should fit well, if my guess is right, in many an urgently needed study course. The author has a distinct talent for simplification and popularization without too much thinning out of the real intellectual matter.

There is body to these chapters,—good logic, a background of contemporary awareness of psychological scholarship and economic trends and moods. And all is compounded in plain language and with enough anecdote to sweeten the dose. As reading, it will be informative in an introductory way; as a text on which to base discussion conference, it will raise the basic questions. I prophesy a large use of this book to the immense benefit of the average level of supervisory knowledge, good will and dexterity in human dealings, in the defense plants.

The Simo-Graph

(Continued from page 109)

time variations can be seen directly while the film is first analyzed. Instead of one time value, the simo-graph shows the range of all the available times, for each therblig. The representativeness of the average is thereby made more evident. The simo-graph emphasizes the variations in times, and focuses attention upon the uneconomical variations in the motion pattern.

Consequently, as a more accurate and detailed record the simo-graph furthers scientific research on methods work.